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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/525,923	02/25/2005	Leonid B. Rubin	DFEI-1-1001	2805
7590 Richard T Black Black Lowe & Graham 701 Fifth Avenue Suite 4800 Seattle, WA 98104			EXAMINER BARTON, JEFFREY THOMAS	
			ART UNIT 1753	PAPER NUMBER
SHORTENED STATUTORY PERIOD OF RESPONSE		MAIL DATE	DELIVERY MODE	
3 MONTHS		02/01/2007	PAPER	

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary

Application No.

10/525,923

Applicant(s)

RUBIN ET AL.

Examiner

Jeffrey T. Barton

Art Unit

1753

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 December 2006.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-38 is/are pending in the application.
- 4a) Of the above claim(s) 6, 7, 9-26, 34 and 35 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5, 8, 27-33, and 36-38 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Election/Restrictions

1. Newly submitted claims 34 and 35 are directed to an invention that is independent or distinct from the elected invention for the following reasons: Applicant points to support in Figure 8 for the material of claim 34, but this species (i.e. Species B, original claim 6) was not elected in the election filed on 24 July 2006. Similarly, Applicant indicates support for new claim 35 in Figure 10, which clearly corresponds to the endless continuous strip electrode species E, original claims 15-17 (Note Specification Page 11, lines 10-15), which was also not elected in the reply of 24 July 2006.

Since applicant has received an action on the merits for the invention of Species A, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claims 34 and 35 are withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

2. Claims 6, 7, 9-17, 20-26, 34, and 35 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected species, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on 24 July 2006.

3. This application contains claims 18 and 19 drawn to an invention nonelected with traverse in the reply filed 24 July 2006. A complete reply to the final rejection must

include cancellation of nonelected claims or other appropriate action (37 CFR 1.144)

See MPEP § 821.01.

Status of Objections and Rejections Pending Since the

Office Action of 28 August 2006

4. The previous objections to claims 1, 5, and 8 are withdrawn due to Applicant's amendment.
5. The rejections of claims 1-5 and 8 under 35 U.S.C. §112, second paragraph are withdrawn due to Applicant's amendment.
6. All other rejections are maintained.

Claim Objections

7. Claim 1 is objected to because at line 13 of the claim, "(having a low melting point,)" is recited, though it is unclear what purpose the parentheses serve in the claim. The claim would be clearer if the parentheses were deleted.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

8. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

9. Claims 1-5, 8, 27-33, and 36-38 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claims contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Independent claim 1 has been amended to recite, “a coating comprising an alloy (having a low melting point,)”, which lacks support in the original disclosure. All relevant portions of the specification and original claim 1 recited “a coating *consisting of* an alloy with a low melting point” (italics added), and there is no support in the specification for other components of the coating, to which the new “comprising” language is open. The same grounds apply to claims 2-5, 8, 27-33, and 36-38.

In addition, claim 2 has been amended to recite, “wherein said outer wires are operably configured for connection to a second terminal bar”, with no clear support for this broadening language. Use of the original “electrically connected” language is recommended. The same grounds apply to claims 3-5, 8, and 29-31.

In addition, claim 28 recites a limitation, “wherein said wires embedded into said adhesive layer extend generally perpendicularly to a longitudinal axis of said film”, which finds no clear support in the specification as filed.

In addition, claim 29 recites a limitation, “wherein said outer wires extend generally parallel to a longitudinal axis of said film”, which finds no clear support in the specification as filed.

Art Unit: 1753

In addition, claim 36 recites a limitation, "wherein said film is sufficiently thick to be drawn" which finds no clear support in the specification as filed.

10. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

11. Claim 33 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention. Claim 33 recites "a first terminal bar", although "a first terminal bar" was recited in claim 1. It is unclear whether this must be the same terminal bar.

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

Art Unit: 1753

4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

14. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

15. Claims 1-5, 27-33, 36, and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Little in view of Shiotsuka et al. (EP 0 807 980 A2)

Little discloses an electrode in a photovoltaic element (Figures) comprising an electrically insulating optically transparent film (34), an adhesive layer (AR coating on surface 32; Column 7, lines 6-32) provided on a surface of the film, a first plurality of parallel electrically conductive wires (24) embedded in the adhesive layer (Column 7, line 6 - Column 8, line 25), a part of the surfaces of these wires protruding from the adhesive layer (Figures 9 and 10 - necessary for contact to the cell), wherein the wires are connected to a first terminal bar. (Figures 4 and 5, interconnect 70; Column 9, line 53 - Column 10, line 30; wires are connected through buses 28)

There is no structure recited to distinguish the claimed "film" from the plate 34 of Little - a thick "film" reads on a "plate", and a thin "plate" reads on a "film", particularly when using the plastic plate taught by Little. (Column 6, line 68 - Column 7, line 5) Additionally, within the interpretation of the Examiner, the wires of Little are embedded in the softened antireflective coating on the interior face of plate 34 - this layer is adhesive (Note particularly Column 8, lines 21-25).

Relevant to claim 2, Little also discloses a second plurality of wires (28) running parallel to each other and disposed between the transparent film (34) and wires (24) of the first plurality, causing the wires 24 to read on the claimed "outer wires". (Figure 11; Column 10, lines 39-62) Wires 28 and 24 form a mesh, and wires of the second plurality are connected to another terminal bar (70). (Column 10, lines 27-30 - each bus is provided with an interconnect structure)

Relevant to claim 3, the terminal bars (70) that are connected to parallel bus bars 28 in Little et al are electrically connected to each other through wires 24.

Relevant to claim 4, the terminal bars are connected to the respective ends of each bus bar 28. (Column 10, lines 2-30; Figures 4 and 5)

Relevant to claim 5, in the embodiments with multiple bus bars 28 (e.g. Figure 1), the interconnects 70 connected to the outermost bus bars 28 can be described as being provided at opposite ends of the wires 24. Interconnects 70 are clearly provided "outside a contour" of the photovoltaic element.

Relevant to claim 27, the wires 24 extend along a longitudinal axis of the film. (Figure 11)

Relevant to claim 28, the wires 28 (Figures 9 and 11) extend perpendicular to a longitudinal axis of the film.

Relevant to claim 29, the wires 24 read on the "outer wires", and extend as claimed. (Figure 11)

Relevant to claim 31, all wires 24 and 28 are shown as having portions embedded in the adhesive layer. (Figure 9)

Relevant to claim 36, the plates 34 of Little are drawn along conveyor 88 (Figure 11) and are disclosed throughout the specification and figures as having sufficient strength to support the AR film. A plastic plate as disclosed by Little (Column 6, line 68 - Column 7, line 5) is considered to inherently meet the elasticity limitation.

Little does not explicitly disclose a low melting alloy coating provided on the surface of the first plurality of wires. Little is also silent concerning the thickness of the AR layer (Claim 32), does not teach a plate/film thickness of 20-50 micrometers (Claim 37), and is silent concerning the specific orientation of the interconnections 70, which correspond to the instantly claimed terminal bar. (Claim 33)

Shiotsuka et al teach that it is conventional in the photovoltaic art to connect electrodes to bus bars using solder. (Page 2, lines 28-33)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the electrode of Little by connecting wires 24 to busbars 28 using solder, as taught by Shiotsuka et al, because it would have provided a simple

Art Unit: 1753

means of securing solid electrical connection and maintaining the desired spatial relationship of the wires and buses. Since conventional solders comprise low-melting alloys, such as Pb/Sn, such modification meets the limitations of the claims. This combination meets the limitations of claim 30, as well.

Regarding claim 32, Little discloses using wires of 1.6 mil diameter (Column 12, lines 51-53), which corresponds to about 41 microns. This is much thicker than typical antireflective coatings used in the art, which are on the order of a few microns or less in thickness. The position that the wires are thicker than the antireflective layer is supported by the teaching of Little at Column 8, lines 4-17, which describes deformation of the plate that underlies the AR coating upon pressing of the wires into the surface. The deformation would have been primarily in the AR coating if it were thicker than the wires. Furthermore, such deformation of a thicker ceramic antireflective coating (Column 7, lines 19-23) would have required higher temperatures, since these materials will not soften at 700 °C. Therefore, the Examiner's position is that the AR coating of Little is thinner than the 41-micron thick wires disclosed.

Regarding claim 33, the arrangement of solar cells in a module shown by Little et al (Figure 4) involves positioning cells in a rectangular array, with interconnections running between adjacent cells. It would have been obvious to one having ordinary skill in the art to specifically orient these interconnections along the intercell pathways defined in a rectangular grid (e.g. spaces between the cells in figure 4), depending on whether cells in a row or column are desired to be connected in series or parallel. For instance, with the cell arrangement shown in figure 4, if a skilled artisan having a high-

Art Unit: 1753

current application desired to connect cells in parallel, it would have been obvious to run a connector 70 between wires 28 of adjacent cells along the space between cell rows. Such a connection would be transverse to wires 28, and meet the limitations of the claims.

Regarding claim 37, in *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), *cert. denied*, 469 U.S. 830, 225 USPQ 232 (1984), the Federal Circuit held that, where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions would not perform differently than the prior art device, the claimed device was not patentably distinct from the prior art device. The choice of thickness of the film would not significantly alter the performance of the claimed electrode.

16. Claims 1-4, 27-29, 31, 33, and 36-38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nath et al in view of Ichinose et al.

Nath et al disclose an electrode in a photovoltaic element (Figures) comprising an electrically insulating optically transparent film (e.g. Figure 1C, layers 25a, 25c, 25e, or 25g), an adhesive layer (Thermoplastic; Column 5, line 62 - Column 6, line 19) provided on a surface of the film, a first plurality of parallel electrically conductive wires (24) embedded in the adhesive layer (Figures 1A-1D; Column 5, lines 8-20; after the lamination process described at Column 7, lines 6-27, the adhesive 25b surrounds glass fiber 25a, and wires 24 will be embedded therein), a part of the surfaces of these wires protruding from the adhesive layer (Inherently necessary for contact to the cell),

Art Unit: 1753

wherein the wires are connected to a first terminal bar. (e.g. busbars 27 at either end of the cell shown in Figure 1B read on "terminal bars")

Relevant to claim 2, Nath et al also disclose a second plurality of wires (Internal busbars 27) running parallel to each other and disposed between the transparent film (34) and wires (24) of the first plurality. (Column 5, lines 8-16; in the embodiment where wires are used, one of the other of wires 24 and 27 must be disposed between the film and the other wire - either would be obvious to place in this position) Wires 27 and 24 form a mesh (Figure 1B), and wires of the second plurality are connected to another terminal bar. (e.g. busbars 27 at either end of the cell shown in Figure 1B read on "terminal bars", and are connected to the other busbars 27 through wires 24)

Relevant to claim 3, all wires/terminal bars shown in Figure 1B are electrically connected to each other.

Relevant to claim 4, the terminal bars are connected to the respective ends of each bus bar 28. (Column 10, lines 2-30; Figures 4 and 5)

Relevant to claims 27-29, wires within the unit of Nath et al are shown as running parallel and perpendicular to a longitudinal axis of the substrate. (Figure 1B)

Relevant to claim 31, upon lamination, all wires will have portions embedded in the adhesive thermoplastic.

Relevant to claim 33, the busbars 27 at either end of the cell shown in Figure 1B of Nath et al read on such terminal bars.

Relevant to 36, any of fiber layers 25a, c, or e, or protective member 25g is considered to meet these limitations.

Regarding claim 37, layer 25g is disclosed as being a 1.5 mil (25 micrometer) Tefzel sheet.

Nath et al do not explicitly disclose a low melting alloy coating provided on the surface of the first plurality of wires.

Ichinose et al teach coating electrode wires in photovoltaic cells with conductive anti-corrosion films, such as silver-palladium alloy. (Column 9, lines 35-44) Specific to claim 38, this coating is provided on the entire surface of the electrode wires. (Figure 1B)

It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the electrode of Nath et al by providing it with an anti-corrosion silver-palladium alloy film, as taught by Ichinose et al, because prevention or reduction of corrosion would have been expected to increase the useful lifetime of the cells. Since a silver-palladium alloy has a lower melting point than numerous other materials (e.g. pure palladium), it reads on a broadly recited "alloy with a low melting point" in the absence of a definition of what is considered a low melting point.

Response to Arguments

17. Applicant's arguments filed 28 December 2006 have been fully considered but they are not persuasive.

Applicant continues to traverse the requirement for election, although this was made final in the Office Action of 28 August 2006. The requirement is still deemed

proper for the same reasons. Applicant is reminded that claims to nonelected species will be entitled to consideration upon presentation of an allowable generic claim.

Regarding the rejections based on Little in view of Shiotsuka, Applicant argues that the “plate” of Little does not meet the instant limitation to a “film”. The Examiner maintains that there is no clear structural distinction between the two, and that a thin “plate” would certainly correspond to a film or that a thick “film” would certainly correspond to a plate, particularly in a device using the plastic plate disclosed by Little at Column 6, line 68 - Column 7, line 5.

In addition, Applicant contends that the antireflection coating of Little is not adhesive. Inasmuch as Little teaches the adhesion of this film to the plate (Column 8, lines 21-25), this film is considered to clearly meet a broad limitation to “an adhesive layer”.

Applicant also argues that a wire could not be embedded in a layer of the thinness required of the AR coating of Little. (Page 12, 1st paragraph) The Examiner’s position is that since the plate is coated with the AR film, and then the wires are subsequently embedded into the surface of the plate that had been coated with the AR film, then the wires can certainly be considered to be embedded in AR film on the surface of the plate.

Applicant argues that Little teaches away from providing an adhesive layer, since he uses electrostatic bonding. This is not persuasive since the AR coating used by Little clearly reads on the broadly claimed adhesive layer, for the reasons indicated above. No modification of the teachings of this reference is necessary to meet this

Art Unit: 1753

limitation. Applicant's description of the adhesive used by Shiotsuka has no relevance to the rejection.

Applicant provides narrative descriptions of how the instant disclosure is different from that of the cited references, but such arguments are not persuasive because they do not correspond to any explicitly recited limitations in the claims. The structures taught by the prior art read on the instant claims, and the claims are therefore not patentable.

Regarding the rejections based on Nath et al in view of Ichinose et al, Applicant argues that Nath et al do not teach an adhesive layer with wires embedded into the adhesive layer. Nath et al clearly teach such a structure. Upon completion of the lamination procedure taught at Column 7, lines 6-27, wires 24 and 27 (Figure 1a) will very clearly be embedded in the adhesive EVA layer of encapsulant 25. Nath et al disclose the encapsulant 25 as being adhesive (Column 7, lines 22-25). Applicant's comments concerning a conductive adhesive are confusing since the ethylene vinyl acetate used by Nath et al is insulating. The conductive adhesive used by Nath et al (Column 5, lines 13-16) is used to attach the electrodes to the solar cell, and is not particularly relevant to the rejection made.

Conclusion

18. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

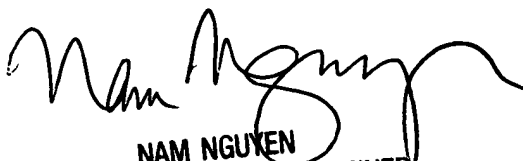
19. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Dr. Jeffrey T. Barton whose telephone number is (571) 272-1307. The examiner can normally be reached on M-F 9:00AM - 5:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam Nguyen can be reached on (571) 272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1753

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

JTB
30 January 2007


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